

Canadians who earn employment income must pay into the Canada Pension Plan (CPP). Your employer pays one-half the contribution and you pay the other half. If you are self-employed, you pay the whole contribution. The CPP provides a retirement pension for the contributor.

The pension pays about 25% of the earnings on which you paid into the plan. In 2005, this means a maximum pension of about \$9945 per year at age 65 (approx. \$828.75/month). If a person retires earlier than age 65, the amount is reduced by 0.5% for each month the person receives a pension before his or her 65<sup>th</sup> birthday. For example, a person aged 60 who retired in 1999 would receive a pension of about \$6300 per year.

Since the CPP replaces only a small percent of a person's income, it is that person's responsibility to replace all or most of the remainder. This may be done in different ways, such as a company or private pension plan. Also, each person should contribute to a Registered Retirement Savings Plan (RRSP) to supplement retirement income.

When you invest in an RRSP, you do not pay taxes now on money you save. Contributions to your RRSP are deducted from your taxable income for the year and may result in a tax refund. The income tax is paid when the money is withdrawn from the plan. This provides substantial tax savings because your income will be lower when you retire, and thus taxed at a lower rate.

An RRSP can be opened at most financial institutions. We shall consider what we can contribute and how these contributions grow. In 2007, a person who earned employment income could contribute to an RRSP until the end of the year in which he or she turns 71. The person could contribute 18% of his or her income to a maximum of \$20000 per year.

Eg.1: Anne has an annual earned income of \$30000, and does not have a company pension plan.

- a) How much can Anne contribute to an RRSP?
- b) Anne pays income tax at 29%. How much is Anne's income tax rebate on this contribution?

**Solution:**

- a) **Anne can contribute 18% of her earnings.**  
 $18\% \text{ of } \$30000 = 0.18 \times 30000 = \$5400$
- b) **Anne gets an income tax rebate of 29% of \$5400.**  
 $29\% \text{ of } \$5400 = 0.29 \times 5400 = \$1566$

Eg.2: Suppose Anne's RRSP contribution earn interest at an average rate of 8%/a. compounded annually.

- a) What will the contribution amount to in 40 years?
- b) Suppose Anne invests \$5400 each year in an RRSP, for 40 years, at the same average interest rate. What will the amount be at the end of 40 years?

**Solution:**

- a) **Her RRSP contribution is considered a lump sum payment (one time deposit) and is receiving compound interest. Using  $A = P(1+i)^n$  with  $P = 5400$ ,  $i = 0.08$  and  $n = 40$ . The amount after 40 years is \$117 312.42**
- b) **If Anne makes regular contributions of \$5400 each year then it is an annuity. Using the formula  $FV = \frac{R[(1+i)^n - 1]}{i}$  with  $R = 5400$ ,  $i = 0.08$  and  $n = 40$ . The future value of the annuity after 40 years is \$1 398 905.20**

The more often interest compounds, the faster money grows. People should start to contribute as much as they can afford to an RRSP as early as possible.

Complete the following exercises to learn how different RRSP contributions can grow.

1. During the year she was 20 years old, Celeste worked in a far north community. She received a lump sum isolation bonus of \$12000 when she returned home. To save paying the income tax on the bonus, Celeste deposited the bonus in an RRSP.
  - a. Celeste was in the 40% tax bracket. How much less tax did she pay for the year by investing in the RRSP?
  - b. Celeste left the money in her RRSP for 35 years. Her RRSP earned interest at an average rate of 10%/a. compounded annually. How much was in the RRSP account at the end of the 35 years?
  - c. Celeste invested her tax rebate from part a, in another RRSP account the next year. This account also earned an average of 10%/a. compounded annually over the next 34 years. How much was there in this account at the end of the 34 years?
  - d. Determine the total amount in the RRSPs in part b and c.

**[ \$4800 , \$337229.24 , \$122628.82 , \$459858.06 ]**

2. Maurice started an RRSP when he began his part-time job at age 16. Maurice invested \$20 at the end of each month in an RRSP, starting the month following his birthday. Maurice made the same monthly deposit until his 50<sup>th</sup> birthday. The account paid interest at an average rate of 8.5%/a. compounded monthly. How much did Maurice have in the RRSP on his 50<sup>th</sup> birthday?

**[ \$47466.17 ]**

3. Nabita entered the workforce at age 40. When immediately began to invest the maximum contribution in an RRSP. Her average salary over the next 20 years was \$38000 per year.
  - a. What was the average contribution Nabita made to her RRSP each year?
  - b. Assume Nabita made her average contribution at the end of each year and it earned an average rate of 12%/a. compounded annually. How much did Nabita have in her RRSP account at the end of the 20 years?

**[ \$6840 , \$492838.71 ]**

4. Pete started an RRSP account when he was 21 years old. He deposited \$50 in the account at the end of each month. Pete started investing one month after he turned 21, and continued until his 50<sup>th</sup> birthday. His account earned an average of 9.6%/a. compounded monthly.
- How much was in the account on his 50<sup>th</sup> birthday?
  - Suppose Pete had made \$100 contributions instead of \$50. How much would be in the account on his 50<sup>th</sup> birthday?
  - By doubling a contribution, does the amount in the RRSP double? Explain.

**[ \$93783.44 , \$187566.87 , Yes ]**

5. Anders started to make yearly contributions to his RRSP at age 20. At the end of the year, he contributed \$3000 to his RRSP and continued to do so for the next 10 years. At age 30, Anders income had grown. He increased his annual contribution to \$7000, which continued for another 10 years. At age 40, Anders was again able to increase his annual contribution to \$10000 for another 10 years. At age 50, Anders increased his annual contribution to \$15000 for another 5 years, then he retired. Anders RRSP earned an average of 10%/a. compounded annually.
- Calculate the amount in the RRSP at the end of the first 10 years. What will this amount to at the end of 25 years?
  - Calculate the amount of the \$7000 contributions at the end of the 10 years. What will this amount to at the end of 15 years?
  - Calculate the amount of the \$10000 contributions at the end of the 10 years. What will this amount to at the end of 5 years?
  - Calculate the amount of the \$15000 contributions at the end of the 5 years.
  - Calculate the total amount Anders had in his RRSP at retirement.

**[a) \$47812.27; \$518031.89 at end of 25 years ]**

**[b) \$111561.97; \$466022.04 at end of 15 years ]**

**[c) \$159374.25; \$256673.82 at end of 5 years ]**

**[d) \$91576.50 ]**

**[e) total: \$1332304.25 ]**

A general statement concerning RRSPs is that you should start to contribute as early as possible (although the contribution may be small) and as often as possible, rather than wait until later and make larger contributions.